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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/510,901	04/21/2005	Henk Ouwerkerk	B-5550PCT 622237-5	8585

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EXAMINER	
KIM, TAE JUN	

ART UNIT	PAPER NUMBER
3746	

MAIL DATE	DELIVERY MODE
08/10/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/510,901	OUWERKERK, HENK	
	Examiner	Art Unit	
	Ted Kim	3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06/07/2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) *7* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6 and 8-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *05/19/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Claim 7 is withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected species there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 06/07/2007. While the restriction requirement has been deemed proper, the election of species requirement has been withdrawn for original species I-V which are now regrouped as species I', the rest of the species have been maintained. Hence, applicant's election of original species V, now corresponds to species I'. The traversal is based on the fact that there is a generic independent claim 1 and the presumption of an allowable generic claim would render the restriction moot if the generic claim is allowable. However, this is only a presumption on applicant's part. There is no evidence of patentability for the generic claim and hence, the restriction between the species is deemed proper. Furthermore, while applicant argues the expense of multiple applications, the proliferation of alternative species for application of the invention is clearly a serious burden on the PTO and thus constitutes grounds for restriction.

2. This application contains claims directed to more than one species of the generic invention. These species are deemed to lack unity of invention because they are not so linked as to form a single general inventive concept under PCT Rule 13.1.

The species are as follows:

Species I': Fig 3-7

Species II': Fig. 8 (plural shaft arrangement for each steam turbine and compressor)

Species III': Fig. 9 (parallel arrangement of multiple compressors and steam turbines)

3. The claims are deemed to correspond to the species listed above in the following manner:

Species I': Fig 3-7 (claims 4-6, 8-10)

Species II': Fig. 8 (claims 4, 5, 7)

Species III': Fig. 9 (only generic claims read on this species)

The following claim(s) are generic: 1-3, 11-14.

Drawings

4. Figures 1, 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-6, 8-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- Claim 1, last two lines, "one or more of said steam turbines" lacks proper antecedent basis.
- Claim 6, "the steam turbines" lacks proper antecedent basis.
- Claim 11 "one or more of said steam" lacks proper antecedent basis.
- Claim 12 "one or more of said gas" lacks proper antecedent basis
- Claim 13 "one or more of said gas" lacks proper antecedent basis.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1, 2, 4-6, 8-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Frutschi (6,223,523) in view of either the common knowledge in the art or Lardi et al (3,948,054) and optionally in view of Rice (4,896,499). Frutschi teaches a steam and gas turbine installation comprising a gas turbine unit (1, 3, 5) and a steam turbine unit (16, 17), in which the gas turbine unit is built up in part of at least: a gas compressor 1

mounted on a compressor shaft (47), a combustion chamber (2) and a gas turbine (3) mounted on a gas turbine shaft (47); and in which steam turbine unit (16, 17) is built up in part of: a closed steam line (34, 20, 21, 32 ...), at least comprising: a pump (25 or 29a), a steam generator (15), which is in heat-exchanging contact with combustion gases (11) from the gas turbine (3) during operation, a steam turbine (16, 17) mounted on a steam turbine shaft (47), as well as a condenser (22), and in which the steam turbine drives the gas compressor of the gas turbine unit during operation; characterized in that the steam turbine and the gas compressor are mounted on the same shaft (47). Frutschi does not teach the one or more of said steam turbines is an impulse steam turbine. However, as well known in the art, including in thermodynamics textbook, using impulse steam turbines is entirely conventional in the art, as there are only two choices, impulse steam blades or reaction steam blades.

The following information is freely available on steam turbines from http://www.roymech.co.uk/Related/Thermos/Thermos_Steam_Turbine.html

Introduction

A steam turbine is a mechanical device that converts thermal energy in presssurised steam into useful mechanical work. The original steam engine which largely powered the industrial revolution in the UK was based on reciprocating pistons. This has now been almost totally replaced by the steam turbine because the steam turbine has a higher thermodynamic efficiency and a lower power-to-weight ratio and the steam turbine is ideal for the very large power configurations used in power stations. The steam turbine derives much of its better thermodynamic efficiency because of the use of multiple stages in the expansion of the steam. This results in a closer approach to the ideal reversible process.

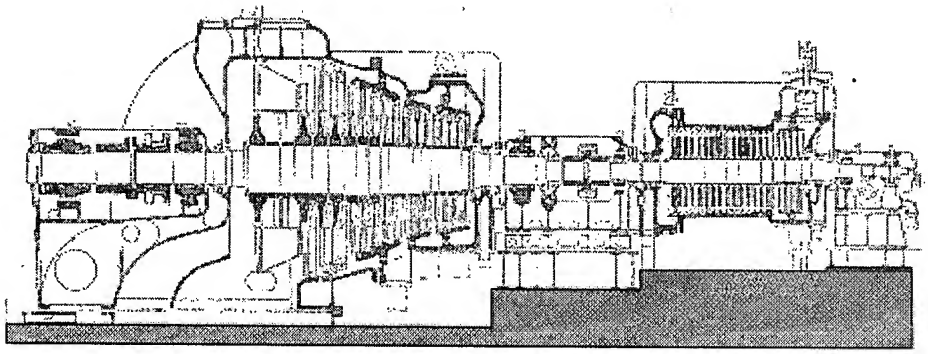
Steam turbines are made in a variety of sizes ranging from small 0.75 kW units used as mechanical drives for pumps, compressors and other shaft driven equipment, to 1,500,000kW turbines used to generate electricity. Steam turbines are widely used for marine applications for vessel propulsion systems. In recent times gas turbines , as developed for aerospace applications, are being used more and more in the field of power generation once dominated by steam turbines.

Steam Turbine Principle

The steam energy is converted mechanical work by expansion through the turbine. The expansion takes

place through a series of fixed blades (nozzles) and moving blades each row of fixed blades and moving blades is called a stage. The moving blades rotate on the central turbine rotor and the fixed blades are concentrically arranged within the circular turbine casing which is substantially designed to withstand the steam pressure.

On large output turbines the duty too large for one turbine and a number of turbine casing/rotor units are combined to achieve the duty. These are generally arranged on a common centre line (tandem mounted) but parallel systems can be used called cross compound systems.

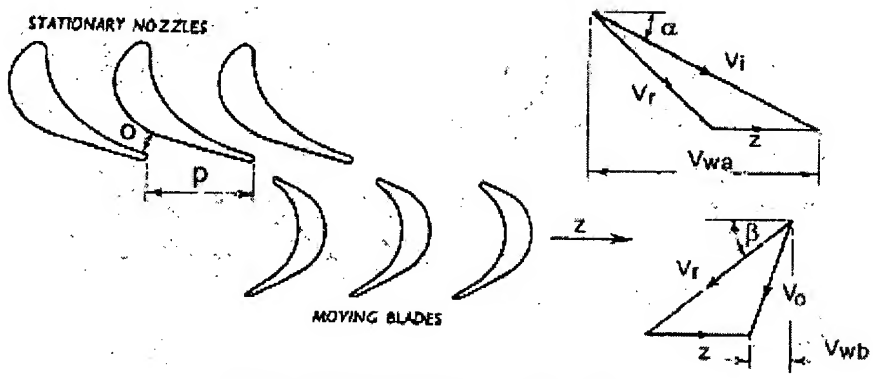


Two Turbine Cylinders Tandem Mounted

There are two principles used for design of turbine blades the impulse blading and the reaction blading.

Impulse Blading

The impulse blading principle is that the steam is directed at the blades and the impact of the steam on the blades drives them round. The day to day examples of this principle is pelton wheel. In this type of turbine the whole of the stage pressure drop takes place in the fixed blade (nozzle) and the steam jet acts on the moving blade by impinging on the blades.



Velocity diagram impulse turbine stage

z represents the blade speed , V_r represents the relative velocity, V_{wa} & V_{wb}- represents the tangential component of the absolute steam in and steam out velocities

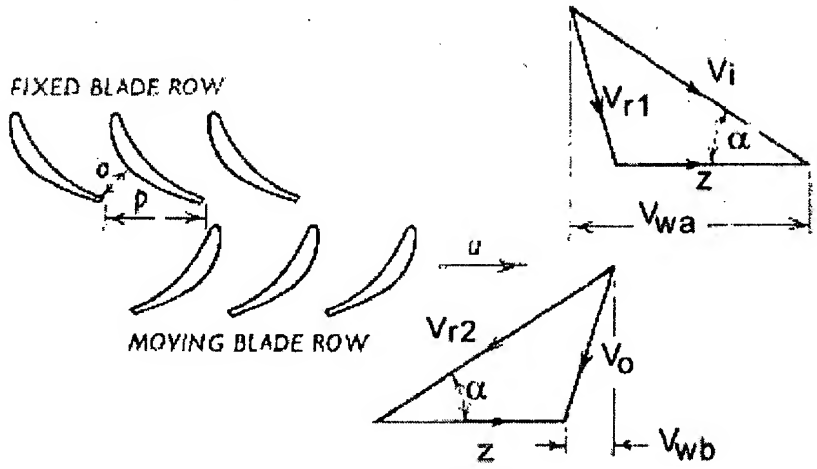
The power developed per stage = Tangential force on blade x blade speed.

$$\text{Power /stage} = (V_{wa} - V_{wb}).z/1000 \text{ kW per kg/s of steam}$$

Reaction Blading

The reaction blading principle depends on the blade diverting the steam flow and gaining kinetic energy by

the reaction. The Catherine wheel (firework) is an example of this principle. For this turbine principle the steam pressure drop is divide between the fixed and moving blades.



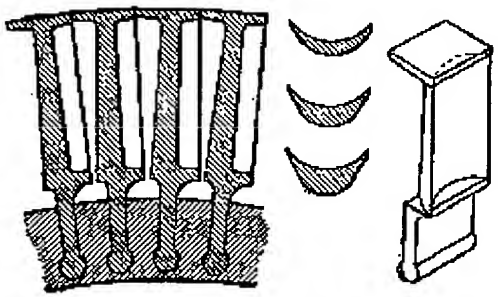
Velocity diagram reaction turbine stage

z represents the blade speed , V_r represents the relative velocity, V_{wa} & V_{wb}- represents the tangential component of the absolute steam in and steam out velocities

The power developed per stage = Tangential force on blade x blade speed.

Power /stage= (V_{wa} - V_{wb}).z/1000 kW per kg/s of steam

The blade speed z is limited by the mechanical design and material constraints of the blades.



Lardi et al teach the hp steam turbine 24 has impulse blading (col. 6, lines 3+). It would have been obvious to one of ordinary skill in the art to employ the impulse turbine for one of the steam turbines, as there are only two classes of steam turbine blading commonly available and/or as the conventional practice in the art. Frutschi does not

teach the compressor 1 with intercooler 36 are two different compressors but illustrate them as a single compressor. Rice teaches that it is well known to employ a further compressor 24 with the compressor 26 stages and intervening intercooler 38. This would allow more optimum matching of the pressures with the intercooled gas and/or greater efficiency. It would have been obvious to one of ordinary skill in the art to employ multiple compressor stages with the intercooler rather than a single compressor, to allow for greater efficiency and/or optimization. In combination, the steam turbine drives at least one further gas compressor, which is connected in series with the first gas compressor via an intercooler 36; characterized in that at least one further steam turbine (17) is connected in series with the steam; characterized in that the gas compressors and the steam turbines are mounted on the same shaft 47; characterized in that the water flowing through the steam line (39) is in heat-exchanging contact during operation with the air 37 flowing through the intercooler; characterized in that said heat-exchanging contact takes place according to the counterflow principle, as taught by Rice (col. 6, lines 61+). The uniflow/coflow principle in intercoolers is also notoriously old and well known in the art; making one or more of said steam turbines a radial steam turbine and one or more of said gas compressors is a centrifugal gas compressor or an axial gas compressor are also notoriously old and well known in the art. It would have been obvious to employ uniflow/coflow principle in intercoolers or a radial steam turbine or a centrifugal or axial compressor, as features which are conventionally employed in the art.

9. Claims 1-3, 5, 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horner (6,003,298) in view of the admitted prior art or Frutschi (6,223,523) and further in view of either the common knowledge in the art or Lardi et al (3,948,054). Horner teaches a steam and gas turbine installation comprising a gas turbine unit (14, 18, 20, 22) and a steam turbine unit (12, 40), in which the gas turbine unit is built up in part of at least: a gas compressor (14) mounted on a compressor shaft (16), a combustion chamber (20) and a gas turbine (22) mounted on a gas turbine shaft (24); and in which steam turbine unit is built up in part of: a closed steam line (STEAM), at least comprising: a pump (7), a steam generator (34), which is in heat-exchanging contact with combustion gases (28) from the gas turbine during operation, a steam turbine (12) mounted on a steam turbine shaft (16), as well as a condenser (not shown), and in which the steam turbine 12 drives the gas compressor 14 of the gas turbine unit during operation on the same shaft. Horner does not show the pump or the condenser, these are features which are essential for operation, as evidenced by the admitted prior art or by Frutschi which illustrates both a pump and condenser. It would have been obvious to one of ordinary skill in the art to employ a pump and condenser as required for normal steam cycle operation. Horner does not teach the one or more of said steam turbines is an impulse steam turbine. However, as well known in the art, including in thermodynamics textbook, using impulse steam turbines is entirely conventional in the art, as there are only two choices, impulse steam blades or reaction steam blades, as treated above. Lardi et al teach the hp steam turbine 24 has impulse blading (col. 6, lines 3+). It would have

been obvious to one of ordinary skill in the art to employ the impulse turbine for one of the steam turbines, as there are only two classes of steam turbine blading commonly available and/or as the conventional practice in the art. As for making one or more of said steam turbines a radial steam turbine and one or more of said gas compressors is a centrifugal gas compressor or an axial gas compressor are also notoriously old and well known in the art. It would have been obvious to employ a radial steam turbine or a centrifugal or axial compressor, as features which are conventionally employed in the art.

10. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over any of the above prior art in view of Mastronarde (6,055,803). The prior art teach various aspects of the prior art but do not teach the steam generator is a once-through residual heat boiler. Mastronarde teaches it is old and well known in the art to make the heat recovery steam generator in the exhaust stream of a gas turbine engine a once through residual heat boiler (col. 2, lines 32+) allows for rapid startup and reduces thermal stress limitations. It would have been obvious to one of ordinary skill in the art to make the heat recovery steam generator in the exhaust stream of a gas turbine engine a once through residual heat boiler, as taught by Mastronarde, in order to allow rapid startup and reduce thermal stress limitations.

Contact Information

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Ted Kim whose telephone number is 571-272-4829. The Examiner can be reached on regular business hours before 5:00 pm, Monday to Thursday and every other Friday.

The fax number for the organization where this application is assigned is 571-273-8300.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ehud Gartenberg, can be reached at 571-272-4828. Alternate inquiries to Technology Center 3700 can be made via 571-272-3700.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). General inquiries can also be directed to the Patents Assistance Center whose telephone number is 800-786-9199. Furthermore, a variety of online resources are available at http://www.uspto.gov/main/patents.htm

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